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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,486	01/15/2004	Abdo Esmail Abdo	ROC920030216US1	6177

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IBM CORPORATION  
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EXAMINER
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COLAN, GIOVANNA B

ART UNIT	PAPER NUMBER
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2162

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/758,486	Applicant(s) ABDO ET AL.	
	Examiner Giovanna Colan	Art Unit 2162	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                            |                                                                                         |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                           | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

**DETAILED ACTION**

1. This action is issued in response to the Amendment filed on 11/13/2006.
2. No claims were amended. No claims were canceled. No claims were added.
3. This action is made Final.
4. Claims 1 –23 are pending in this application.
5. Applicant's arguments filed on 11/13/2006 have been fully considered but they are not persuasive.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fritchman (US Patent No. 6,785,677 B1, filed: May 2, 2001) in view of Haas et al. (Haas hereinafter) (Non- Patent Literature: Sampling – Based Selectivity for Joins Using Augmented Frequent Value Statistics, IBM Almaden Research Center, San Jose CA, 1995, IEEE).

Regarding Claims 1, and 11, Fritchman discloses a computer system implementing a relational database system and generating a statistic for a pattern matching predicate on an attribute of a relation of said relational database, to be used in optimizing execution of a query directed to one or more attributes of said relation, comprising

storage for said relational database (Fig. 1, item 15, Col. 6, lines 3 – 6, Fritchman), including a relation having a plurality of tuples including values for a plurality of attributes (Col. 8, lines 13 – 17, Fritchman<sup>1</sup>),

Fritchman further discloses: a data storage structure storing character on an attribute (Col. 8, lines 38 – 41, Fritchman), comprising a first structure storing, for each of a plurality of character positions (Col. 8, lines 3 – 11 and 17 – 23; “ ... a bit vector string noting **the position of any single character wild cards** within the segment is build ...”; and “...the position and length merely identify the portion of the target

string..."; respectively; wherein the portion of the target string corresponds to the character claimed; Fritchman), frequently occurring characters in that character position (Col. 7, lines 43 – 50, "segments consisting of characters between **two or more occurrences** of '%' are interior segments ...substrings within the pattern consisting of two or more adjacent occurrences of '%' ..."; wherein two or more occurrences of '%' correspond to frequently occurring characters claimed; Fritchman). However, Fritchman is silent with respect to statistics on an attribute. On the other hand, Haas discloses: storing character statistics on an attribute (Page 528, para. 7, lines 4 – 6, Haas), and statistics for each frequently occurring character (Page 528, para. 7, lines 1 – 4, Haas).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Haas's teachings to the system Fritchman. Skilled artisan would have been motivated to do so, as suggested by Haas (Page 522, para. 1, lines 11 – 19, Haas), to provide a sampling – based method for estimating "augmented frequent value" (AFV) statistics that does not require indexes on attribute values, requires only one pass through each relation, and uses an amount of memory much smaller than the size of a relation; to reduce the relative cost of sampling by orders of magnitude; and to reduce the relative error of the classical System R selectivity formula. In addition, both of the references (Fritchman and Haas) teach features that are directed to analogous art and they are directed to the same field of endeavor, such as, databases management systems, string character frequencies, and queries. This

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<sup>1</sup> Wherein the candidate rows correspond to the tuples claimed; and the target strings correspond to the values for the attributes claimed (also see "TARGET" field/attribute in Table of Col. 7, Fritchman).

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close relation between both of the references highly suggests an expectation of success.

The combination of Fritchman in view of Haas further discloses: computing circuitry performing query optimization and query execution upon said relational database, said query optimization including generating said statistic for an attribute of said relation by retrieving said statistics in response to said pattern matching predicate based upon the character positions of characters in said pattern matching predicate (Col. 3, lines 54 – 59, Fritchman), and generating said statistic based upon said retrieved character statistics (Col. 3, lines 58 – 63; “then the database can be accessed to retrieve information on matching characters...”; Fritchman; and Page 528, para. 8, lines 10 – 21, “ In the second phase, the relative frequencies ... are computed during single scan of each input relation ...IN the final phase, an approximate set of AFV statistics is computed as follows...for each attribute value in the merged set we store the frequencies of the value...”; Haas).

Regarding Claims 2, and 12, The combination of Fritchman in view of Haas discloses a computer system wherein said data storage structure further stores a count of a number of occurrences of a frequently occurring character (Col. 9 and 10, lines 65 – 67 and 7 – 13; respectively, Fritchman).

Regarding Claims 3, and 13, The combination of Fritchman in view of Haas discloses a computer system wherein said data storage structure further comprises a second structure storing frequently occurring characters that are subsequent to the frequently occurring characters stored in said first structure (Col. 10, lines 7 – 13, position ... character + N, Fritchman<sup>2</sup>; and Page 528, para. 8 and 9, lines 18 – 21 and 1 – 3, the input of the value in each input relation; respectively, Haas<sup>3</sup>).

Regarding Claims 4, and 14, The combination of Fritchman in view of Haas discloses a computer system wherein said second data storage structure further stores a probability of occurrence of a frequently occurring subsequent character (Page 528 and 529, para. 10 and 11, lines 3 – 6 and 4 – 9, Haas).

Regarding Claims 5, and 15, The combination of Fritchman in view of Haas discloses a computer system wherein said computing circuitry generates said statistic based upon said retrieved character statistics by estimating a statistic for a desired character and desired character position, in the event said statistic is not stored in said first structure (Page 528, para.8, lines 14 – 18, Haas<sup>4</sup>).

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<sup>2</sup> Wherein character + N corresponds to frequently occurring characters that are subsequent as claimed.

<sup>3</sup> Wherein the step of storing the frequency of the values of elements in V corresponds to the step of storing frequently occurring characters that are subsequent as claimed. Haas discloses: "for  $1 \leq k \leq K$ ", which corresponds to the step of going through the values/characters (Page 528, para.9, lines 1 – 5, Haas).

<sup>4</sup> Wherein the attribute values correspond to the desired characters claimed; and  $R_k$  corresponds to the character position claimed.

Regarding Claims 6, and 16, the combination of Fritchman in view of Haas discloses a computer system wherein said computer circuitry performs said estimating by accumulating statistics for said desired character position, for characters other than said desired character, and calculating average frequency of occurrence of characters that do not have statistics stored in said first structure (Page 529, para. 2, lines 1 – 4, Haas).

Regarding Claims 7, and 17, the combination of Fritchman in view of Haas discloses a computer system wherein said first structure is a table (Fig. 2, item 20, Col. 6, lines 47 – 51, Fritchman; and Page 525, Table 1, Haas).

Regarding Claims 8, and 18, the combination of Fritchman in view of Haas discloses a computer system wherein said first structure comprises a linked list (Fig. 2, item 20, 21, Col. 9, lines 30 – 33, Fritchman).

Regarding Claims 9, and 19, the combination of Fritchman in view of Haas discloses a computer system wherein said second structure comprises a table (Fig. 2, item 21, Col. 6, lines 47 – 51, Fritchman; Page 529, Table 2, Haas).

Regarding Claims 10, and 20, the combination of Fritchman in view of Haas discloses a computer system wherein said second structure comprises a linked list (Fig. 2, item 21, 22, Col. 9, lines 30 – 33, Fritchman).



Regarding Claim 21, the combination of Fritchman in view of Haas discloses a program product for implementing a relational database system and generating a statistic for a pattern matching predicate on an attribute of a relation of said relational database, to be used in optimizing execution of a query directed to one or more attributes of said relation, comprising

a relational database (Fig. 1, item 15, Col. 6, lines 3 – 6, Fritchman), including a relation having a plurality of tuples including values for a plurality of attributes (Col. 8, lines 13 – 17, Fritchman<sup>5</sup>),

a data storage structure storing character statistics on an attribute (Col. 8, lines 38 – 41, Fritchman), comprising a first structure storing, for each of a plurality of character positions (Col. 8, lines 17 – 23, Fritchman), frequently occurring characters in that character position (Col. 7, lines 43 – 50, two or more occurrences, Fritchman), and statistics for each frequently occurring character (Page 528, para. 7, lines 1 – 4, Haas), and

relational database software (Fig. 1, item 15, Col. 9, lines 16 – 20, Fritchman) performing query optimization and query execution upon said relational database, said query optimization including generating said statistic for an attribute of said relation by retrieving said statistics in response to said pattern matching predicate based upon the character positions of characters in said pattern matching predicate (Col. 3, lines 54 – 59, Fritchman), and generating said statistic based upon said retrieved character

statistics (Col. 3, lines 60 – 63, Fritchman; and Page 528, para. 8, lines 14 – 16, a set of AFV statistics is computed, Haas), and

a signal bearing media holding said relational database and relational database software (Fig. 1, item 12, network protocol, Col. 9, lines 17 – 19, Fritchman).

Regarding Claim 22, the combination of Fritchman in view of Haas discloses a program product wherein the signal bearing media comprises transmission media (Fig. 1, item 12, network protocol, Col. 9, lines 17 – 19, Fritchman).

Regarding Claim 23, the combination of Fritchman in view of Haas discloses a program product wherein the signal bearing media comprises recordable media (Fig. 1, items 10 and 13, Col. 9, lines 19 – 26, client and server, Fritchman).

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<sup>5</sup> Wherein the candidate rows correspond to the tuples claimed; and the target strings correspond to the

### ***Response to Arguments***

1. Applicant cannot show non-obviousness by attacking references individually where, as here, the rejections are based on a combination of references.

In re Keller, 208 USPQ 871 (CCPA 1981).

2. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "characterizing data to estimate a number of matches", "identifying ...", and "...the creation of an index or statistics for text matching") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

3. Applicant argues that the prior art fails to disclose; "a first structure storing, for each of a plurality of character positions, frequently occurring characters in a character position."

Examiner respectfully disagrees. The combination of Fritchman in view of Haas does disclose: a first structure storing, for each of a plurality of character positions (Col. 8, lines 3 – 11 and 17 – 23; " ... a bit vector string noting **the position of any single character wild cards** within the segment is build ..."; and "...the position and length

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values for the attributes claimed (also see "TARGET" field/attribute in Table of Col. 7, Fritchman).

merely identify the portion of the target string..."; respectively; wherein the portion of the target string corresponds to the character claimed; Fritchman), frequently occurring characters in that character position (Col. 7, lines 43 – 50, "segments consisting of characters between **two or more occurrences** of '%' are interior segments ...substrings within the pattern consisting of two or more adjacent occurrences of '%' ..."; wherein two or more occurrences of '%' correspond to frequently occurring characters claimed; Fritchman).

4. Applicant argues that the prior art fails to disclose; "generation of any such statistical information".

Examiner respectfully disagrees. The combination of Fritchman in view of Haas does disclose the claimed invention of: generating said statistic based upon said retrieved character statistics (Col. 3, lines 58 – 63; "then the database can be accessed to retrieve information on matching characters... "; Fritchman; and Page 528, para. 8, lines 10 – 21, " In the second phase, the relative frequencies ... are computed during single scan of each input relation ...IN the final phase, an approximate set of AFV statistics is computed as follows...for each attribute value in the merged set we store the frequencies of the value... "; Haas).

***Conclusion***

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

***Prior Art Made Of Record***

1. Fritchman (US Patent No. 6,785,677 B1, filed: May 2, 2001) discloses a method for execution of query to search strings of characters that match pattern with a target string utilizing bit vector.
2. Haas et al. (Non- Patent Literature: "Sampling – Based Selectivity for Joins Using Augmented Frequent Value Statistics", Peter J. Haas, Arun N. Swami, IBM Almaden Research Center, San Jose CA, 1995, IEEE).


***Points Of Contact***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Giovanna Colan whose telephone number is (571) 272-2752. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Giovanna Colan  
Examiner  
Art Unit 2162  
February 6, 2007

  
Sana Al-Hashemi